

Chapter 2: An Overview of the Challenges and Strategies for Conserving Biodiversity in Washington

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Chapter 2

An Overview of Challenges and Strategies for Conserving Biodiversity in Washington

2.0 Introduction and Overview

This chapter provides the context for understanding both the distribution of fish and wildlife in Washington and the framework that exists to conserve and protect these species and the habitats on which they depend. Bearing in mind that a primary audience for the State Wildlife Action Plan (SWAP) is the Washington Department of Fish and Wildlife (WDFW), this is written from an agency perspective, and intended to lay the groundwork for the conservation actions that are outlined later in the document, in Chapters 4, 5, 6 and 7. These actions will collectively inform WDFW strategic plans and agendas throughout the life of the plan.

Washington is one of the most ecologically diverse states in the United States, due in part to its varied topography, exposure to Pacific Ocean currents and weather patterns, and location on the migratory path of many wildlife species, including birds, California gray whales and Pacific Northwest salmon. Our geographic diversity includes seacoast, shrub-steppe, native grasslands and prairies, river canyons, mountain ranges, and the huge inland estuary known as Puget Sound. Washington contains most of the major ecosystem types found in the western United States, including two that are found nowhere else in the world—the channeled scablands of eastern Washington and the Olympic rainforest.

Biodiversity is partially defined or characterized by species richness—the number of plants and animals that spend all or part of their lifecycle in a particular area. Washington is a permanent or temporary home to thousands of plant and animal species, including 140 mammals, 451 freshwater and saltwater fish species, and 341 species of birds that either breed here or stop here on their annual migrations. Washington also hosts 150 other vertebrate species, 3,100 vascular plant species, and more than 20,000 classified invertebrates. More than 3,000 of the invertebrate species are butterflies and moths. While Washington’s SWAP only focuses on animal species and their associated habitats, it is important to frame this discussion in the larger context of the state’s full biological diversity. Most of the state’s native animal species fall within the legal definition of “wildlife” and are under the purview of the WDFW. Responsibility for native plant conservation, including designated rare plant species, rests with Washington Department of Natural Resources (WDNR) Natural Heritage Program.

Biodiversity is not constant, even in a natural ecosystem with minimal human influence. Changes are accelerated, however, by human population growth, human disturbance, and shifts in economic activity, and Washington’s biodiversity is impacted every day by human disturbance to natural ecosystems. Loss of habitats may lead to loss of species diversity. For example, much of the state is forested and most forests have been harvested, with an estimate of only about 18 percent of old-growth forest habitat remaining. Estuarine (coastal) wetlands are extremely productive biologically, yet more than 90 percent of these wetlands in the Puget Sound region have been lost since European settlement. As Washington

continues to grow and develop, fish and wildlife habitat is being altered and sometimes lost, resulting in a net loss of biodiversity.

The remainder of this chapter presents, at a fairly high level, some of the most challenging problems facing our wildlife populations and the range of specific programs and institutional framework that has been developed to address them. To be effective at stemming the loss of biodiversity, including important fish and wildlife resources, the WDFW and its conservation partners must work together and improve efforts to identify and prioritize the most important places for conservation action. The SWAP recognizes this need and identifies opportunities for collaboration in efforts such as the priority landscapes initiatives, described in Chapter 4, climate change research and monitoring, described in Chapter 5, and several others outlined in Chapter 7, Implementation.

2.1 Washington's Ecoregions

Ecoregions are defined through broad but unique patterns in the landscape. Each ecoregion exhibits a suite of physical and environmental characteristics, including unique combinations of soils, geology, climate, water availability and distribution that shapes the composition and distribution of plant communities and associated wildlife. These factors make ecoregions a useful tool for conservation planning. Ecoregions are used in Chapter 4 – Habitats of Greatest Conservation Need (HGCN) – to provide a landscape context to the discussion of conservation needs related to ecological systems and habitats used with regard to their occurrence within their respective ecoregion.

There are 63 ecoregions delineated in North America, and nine of these ecoregions occur partly, or completely, within Washington (Figure 1).

Figure 1: Washington's Ecoregions



2.2 Wildlife Species Distribution, Status and WDFW Management Priorities

The distribution and richness of Washington's species are dependent on the quality and quantity of habitats available to them. As Washington's habitat base has changed over the last hundred years, so has the distribution and status of the state's wildlife. Wild populations of Pacific salmon and steelhead have diminished in both numbers and diversity with the construction of dams, water development projects, and land use changes. Species such as the greater sage-grouse that are dependent on native shrub-steppe habitat have declined in numbers and distribution as shrub and grassland habitat has been converted to farms and orchards, or been developed for other economic uses. On the other hand, water development in the Columbia Basin has created new areas of wetland habitat for migrating and wintering waterfowl, and the clearing of forests for agriculture in northeast Washington has facilitated the expansion of white-tailed deer into many areas where they did not occur prior to statehood in 1889.

The WDFW and its predecessors, the Department of Fisheries and the Department of Game, have always classified fish and wildlife species for purposes of management and harvest regulation. Historically, management emphasis was almost exclusively on commercially harvested fish species (salmon, shellfish and other food fish) and game species. This began to change in 1972 when a citizen initiative established a Nongame Program funded from the sale of personalized license plates. The mission of the program was to identify and conserve species not identified as game species. In 1980, the Department of Game developed a state list of Endangered Species (which included all federally listed species). In 1990, the Fish and Wildlife Commission adopted WAC 232-12-297, which defines procedures for state listing and delisting of species as Endangered, Threatened or Sensitive. Species on the state list are called Species of Concern.

In 1989, the Department created a statewide list of Priority Habitats and Species (PHS), which has been used to provide important fish, wildlife and habitat information to local governments, state and federal agencies, private landowners and consultants, and tribal biologists for land use planning and wildlife conservation purposes. For more information, go to <http://wdfw.wa.gov/conservation/phs/list/>. PHS is currently the agency's primary means of transferring fish and wildlife information from resource experts to those who protect and manage habitat on both public and private land.

2.2.1 Species of Greatest Conservation Need (SGCN)

The SWAP requires a list of SGCN, updated at least every 10 years. The SGCN list differs from WDFW's Species of Concern list and Priority Habitats and Species list in that it is more comprehensive. It includes not only species known to be imperiled and in immediate need of conservation attention, but also other more common species that are in rapid decline or have other identified conservation concerns. One of the guiding principles of the State Wildlife Planning Process is to encourage conservation actions for species before they become imperiled and opportunities for recovery become more limited. For this reason, the SGCN list also differs from the PHS list of species in that it includes game species only when those populations are low due to declines in habitat or the species has other conservation concerns that can be addressed through the implementation of the SWAP. Alternatively, PHS includes a more comprehensive list of vulnerable game species, since a primary purpose of PHS is to conserve species for recreational and cultural use. Chapter 3 includes a list of all SGCN and more discussion on the criteria and process for determining the 2015 SGCN list. Appendix A includes a fact sheet for every SGCN, describing habitat, distribution and key stressors and conservation actions needed.

2.2.2 Other Managed Species

In addition to adopting strategies to manage species on the statewide SGCN list, the SWAP and SGCN list do not diminish or replace WDFW's responsibility and mission to assess, conserve and manage *all* wildlife and the habitats on which they depend for the benefit of Washington's public. WDFW will continue to conserve and manage other fish and wildlife species and associated habitats for recreational use and/or commercial harvest. The term "other managed species" includes game species not on the SGCN list, including non-natives such as ring-necked pheasant, chukar partridge, and largemouth bass, as well as commercially harvested marine fish, anadromous fish, and shellfish. Many conservation actions undertaken for SGCN, especially actions that protect or restore habitat, will also benefit many game and commercially harvested species. In 2014, the WDFW published the *2015-2021 Game Management Plan*, which articulates management and research objectives, priorities and policies for all terrestrial game species managed by the WDFW. Go to: http://wdfw.wa.gov/conservation/game/for_additional_details. Similar plans for sportfish, commercial fish and shellfish have also been adopted by the WDFW. More complete lists of WDFW management plans are available on the WDFW website (wdfw.wa.gov).

2.2.3 SWAP Habitats of Greatest Conservation Need

The SWAP also requires the identification of habitats important for the conservation of SGCN. The WDFW has updated its 2015 list of important habitats using ecological systems, a classification unit used in the National Vegetation Classification. Each of the SGCN are associated with the specific ecological systems important for their continued persistence. In addition to the relative importance of the ecological systems system to SGCN, the WDNR's Natural Heritage Program provided an assessment of the conservation status for all of the ecological systems found in Washington. For the purposes of the SWAP, we refer to the habitats of greatest conservation need as those ecological systems most at risk (imperiled or critically imperiled) as well as those particularly critical for SGCN (defined by the greatest number of associated SGCN). Chapter 4 provides a full discussion regarding the relationship of ecological systems to habitat, and includes a description of each of the imperiled systems in Washington, the SGCN which depend on them, key stressors and conservation actions needed.

2.3 Major Statewide Conservation Problems and Issues

Most of the major statewide problems affecting Washington's wildlife and biodiversity are the direct or indirect result of human influence on the state's habitat base. Rapid, sustained population growth since the end of World War II has resulted in substantial losses of fish and wildlife habitat in urbanizing areas of the state, as well as a constant invasion of exotic plant and animal species across the landscape. These habitat losses and changes are most profound in the Puget Sound region, which is home to most of the state's human population and where development pressure and urban runoff affect a host of terrestrial and aquatic habitats. Dramatic effects are also apparent for the Columbia Plateau, where much of the native shrub-steppe and grassland habitat has been converted to agriculture. Washington's population is projected to continue to rise, and with this population growth will come more cars and roads, more demand for water, energy and developable land, and increased need for the treatment and disposal of solid waste, sewage and stormwater runoff—all of which will impact the state's wildlife and habitat resources. In the face of this projected growth, the WDFW and its conservation partners find themselves in the difficult position of applying limited funds and staff resources to identifying, conserving and managing the remaining native species and the habitats on which they depend.

In addition to the threats described above, we are now also faced with the unprecedented threat of a changing climate, which has the potential to significantly and irreversibly alter our forests, coasts, wetlands, grasslands, freshwater aquatic systems and the species that depend on these habitats.

The following are the key conservation challenges facing Washington's fish, wildlife and habitat base:

- Habitat loss through conversion, fragmentation and degradation
- Invasive alien plant and animal species
- Water quantity—allocation and diversion of surface water
- Water quality issues
- Forest management issues
- Unsustainable agricultural and improper livestock grazing practices
- Diseases and pathogens
- Inadequate data on wildlife species, populations, and
- Climate change

2.3.1 Habitat loss through conversion, fragmentation and degradation

Habitat conversion, fragmentation, and degradation together pose the most serious state-wide threat to Washington's native fish and wildlife resources. Since statehood in 1889, these combined problems have cost the state more than half of its highest priority functioning habitats, including an estimated 70 percent of estuarine wetlands, 50 to 90 percent of riparian habitat, well over 80 percent of old growth forest, 70 percent of arid grasslands, and more than 50 percent of shrub-steppe. These five native habitat types alone are among the most diverse and productive for the state's native fish and wildlife. About 75 percent of Puget Sound's estuaries and their adjacent habitats, such as grasslands, mixed woodlands and floodplain forests, have been modified so significantly that they no longer provide their original functions.

Once native habitat is converted to other uses, the remaining habitat is often left as isolated fragments in a matrix of multiple land uses. Wildlife populations associated with these fragmented habitats are often blocked from their normal movement patterns and migration routes, and thus subjected to isolation from other breeding populations. Habitat loss and fragmentation also causes increased competition with other species, predation, and increased conflicts with other land uses. In a fragmented landscape, animals have to move from one patch of habitat to another and when this happens, migrating wildlife populations become broken into smaller, isolated units that are more susceptible to population decline, disease impacts, localized natural disasters, and possible extirpation.

Transportation systems such as major highways and roads are also a primary cause of habitat loss and fragmentation, as well as constituting direct barriers to wildlife movement and a source of direct mortality via collisions with vehicles using these roadways. When wildlife populations are low, roadkill mortality is significant, especially for slow-moving animals such as turtles and salamanders and wide-ranging carnivores that have to cross many roads. Washington will continue to experience significant human population growth into the foreseeable future. This growth and development will result in continued loss, conversion and fragmentation of fish and wildlife habitat. Steps are being taken by WDFW, other state and federal agencies, local governments and many private conservation organizations to identify and conserve the most important and productive habitats, as well as to identify habitat connectivity corridors across the state with efforts such as the Washington Habitat Connectivity Working Group (<http://waconnected.org>).

2.3.2 Invasive alien plant and animal species

Invasive species constitute a severe and growing threat to Washington's native wildlife, habitat and biodiversity—second only, many believe, to habitat fragmentation. Across the state, aggressive non-native plants and animals are displacing native species, profoundly altering natural systems and affecting the state's economy and human health. These alien plants and animals have been introduced through both intentional and unintentional mechanisms, including: "hitchhiking" on horses and other livestock, trucks and boats; transport on ocean currents and in ballast water and importation in aquaculture and horticulture products and the pet/aquarium trade. Although many non-native species are unable to form self-sustaining populations and soon disappear, some become established and thrive, often outcompeting native species and adversely changing ecosystems in the process. They evolved in other parts of the world and arrive in Washington without natural predators and diseases that would normally keep their population growth in check in their native environment. The number and abundance of introduced species is both a cause and an indicator of declining ecosystem health.

The effect of invasive species is especially severe in the shared inland marine waters of Puget Sound and Georgia Basin to the north (collectively, the Salish Sea). Examples include cordgrasses (*Spartina*), Japanese eelgrass, wireweed (*Sargassum muticum*), oyster drill, varnish or dark mahogany clam, European green crab, and the American bullfrog. Cordgrass and wireweed outcompete and eliminate native salt marsh vegetation and raise the level of the marsh substrate. Additionally, wireweed clogs intake pipes of industrial facilities and hinders shellfish harvest on oyster beds. Oyster drills prey upon young oysters. The green crab, first reported in Willapa Bay in 1998, is a voracious predator that feeds on many types of organisms, particularly bivalve mollusks (clams, oysters and mussels), polychaetes, small crustaceans and juvenile Dungeness crab, and outcompetes Dungeness crab for habitat and food supply. In freshwater habitats, the proliferation of non-native bullfrogs has had a severe impact on declining species such as western pond turtles, northern leopard frogs, and other native species.

Some of the most destructive invasive plants are found in the shrub-steppe, grassland and forested communities of eastern Washington, where they thrive through the effects of agriculture, grazing, mining and certain natural disturbances such as catastrophic wildfire and floods. These invaders not only out-compete native plants, but also present a severe and growing problem for farmers, ranchers and forest managers. Perhaps the most widespread and problematic of the dryland invasive species is cheatgrass, originally from Eurasia, which has replaced native grassland communities all over the Intermountain West. Cheatgrass has limited or no food value for wildlife and livestock, and it presents a significant fire hazard in both shrub-steppe deserts and ponderosa pine forests, where it can add to the fire fuel load, resulting in hotter wildfires and more damage to native vegetation. Other examples of invasive, nuisance plant species include yellow star thistle, Japanese knotweed, knapweed species, Dalmatian toadflax, and sulfur cinquefoil.

Many freshwater aquatic invasive plants found in Washington were originally brought here as ornamental plants for aquariums or water gardens. These ornamentals are usually hardy species and, when introduced to Washington's waters, often thrive and outcompete native plants. Eurasian water milfoil is one aquatic noxious weed that is a particular problem state wide. It reproduces by fragmentation and proliferates to form dense mats of vegetation in the littoral zone of lakes and reservoirs, where it crowds out native aquatic vegetation, reduces dissolved oxygen and can severely degrade the ecological integrity of a water body in just a few growing seasons.

The invasion of alien plant and animal species is recognized as a critical problem in Washington, not just for native fish, wildlife and biodiversity, but for the state's vital agricultural industry. The problem is currently being addressed at many different levels in Washington, within the constraints of budgets and staffing resources. Examples include Washington's Noxious Weed Control Board, which serves as the state's noxious weed coordination center for the activities of 48 county noxious weed control boards and districts, and the Washington Invasive Species Council, which was established by the legislature in 2006 and tasked with providing policy level direction, planning, and coordination for combating harmful invasive species throughout the state.

2.3.3 Water quantity—allocation and diversion of surface water

The survival, distribution and diversity of Washington's fish and wildlife is largely determined by the availability of water, including water to support aquatic and marine species, water to drink, water to grow wildlife food plants, and water to support the annual upstream and downstream migration of anadromous fish. Water is as important in the Olympic rainforests, which can receive more than 200 inches of moisture a year, as it is in the Juniper Dunes wilderness of eastern Washington, which averages only 8 to 14 inches of annual precipitation. Without adequate water to support fish and wildlife, other conservation issues become secondary.

The relative abundance of water has been a major factor in the growth and development of Washington's landscape and economy since the late 1800s. The seemingly unlimited supply of surface and groundwater encouraged the growth of cities and development of irrigated agriculture, not to mention the generation of hydroelectric power and production of aluminum, both of which require massive amounts of water. Until recent years, water was considered so plentiful in the Northwest that plans were evaluated to divert water from the Columbia River and ship it south to California and other states.

Dams: There are currently over 1,000 dams on Washington's rivers and tributary streams. Because they obstruct the natural flow of rivers, these dams can have many detrimental effects on the aquatic environment, including altering the natural flow cycles of rivers, interrupting the transport of nutrients and sediments normally deposited in deltas and estuaries, fragmenting resident aquatic wildlife populations, and hindering anadromous fish migration between the ocean and upstream spawning areas. Older dams without fish ladders, including Chief Joseph and Grand Coulee Dam on the Columbia River, completely block the upstream migration of fish. Even on newer dams, spinning turbines that generate electricity often disorient, injure or kill juvenile fish on their downstream migration to the sea.

Water diversions: Salmon and other aquatic wildlife depend on reliable water flows during critical periods in their lifecycles. Unless adequate minimum flows are established for fish and wildlife and enforced by Washington state agencies, water withdrawals may result in dewatering important mainstem habitats as well as pools and quiet backwater areas that provide essential habitat for the growth and development of juvenile fish, amphibians and aquatic invertebrates. Inadequate flows and water depth in these backwater areas deprive developing fish eggs of oxygen, make it easier for fish predators to find their prey, and generally interfere with the journey of migrating fish. Interrupting or delaying migration can cause adult fish to resort to spawning in unsuitable habitat.

There are many ongoing state and federal efforts to mitigate for the adverse impacts of past water diversions and dams, ranging from adding or improving fish ladders on hydroelectric dams, to screening fish out of irrigation culverts, to requiring adequate year-round instream flows for fish and wildlife.

These efforts have become more common and better-funded since the listing of numerous Northwest salmonid under the federal Endangered Species Act.

2.3.4 Water quality issues

Major water quality discussions in Washington usually revolve around preserving the quality of public drinking water supplies and the effects of non-point source contamination on ground and surface waters. However, the effect of surface water quality on the health of aquatic ecosystems and wildlife is also becoming increasingly important. The most common water quality problems affecting fish and wildlife in Washington's waters are: 1) fecal coliform bacteria contamination; 2) contaminated sediments, which are a particular problem in Puget Sound; 3) elevated water temperature, which can quickly alter or degrade an aquatic ecosystem; 4) increased sediment in streams, which can blanket important food sources and fish spawning areas; 5) excess nutrients and pesticides washed into lakes and streams from lawns, golf courses and agricultural fields, which can directly poison aquatic organisms or contaminate waterways and 6) issues related to stormwater runoff. Water quality issues related to potential contamination of the Columbia River from the Hanford Nuclear Reservation are also of concern, particularly if long-buried radioactive waste reaches the river or its tributaries.

Recently, a shift in ocean chemistry has been observed in the state's marine waters that is related to increased concentrations of atmospheric carbon dioxide (CO₂). Changing ocean chemistry has profound implications for marine ecosystems. As an example, between 2005 and 2009, disastrous production failures at commercial oyster hatcheries were caused by the arrival of low-pH seawater along the West Coast, which created conditions corrosive to shell-forming organisms like young oysters. Ocean acidification is a reduction in the pH of seawater for an extended period of time due primarily to the absorption of CO₂ from the atmosphere. When CO₂ is absorbed by seawater, chemical reactions occur that lead to increased concentrations of hydrogen ions, causing seawater to become more acidic and causing carbonate ions to be relatively less abundant. Other, local sources of acidification such as nitrogen oxides and sulfur oxide gases, nutrients and organic carbon from wastewater discharges and runoff from land-based activities, can also contribute to ocean acidification. More than 30 percent of Puget Sound's marine species are vulnerable to ocean acidification by virtue of their dependency on availability of carbonate ions to form their calcium carbonate shells, skeletons, and other calcified body parts.

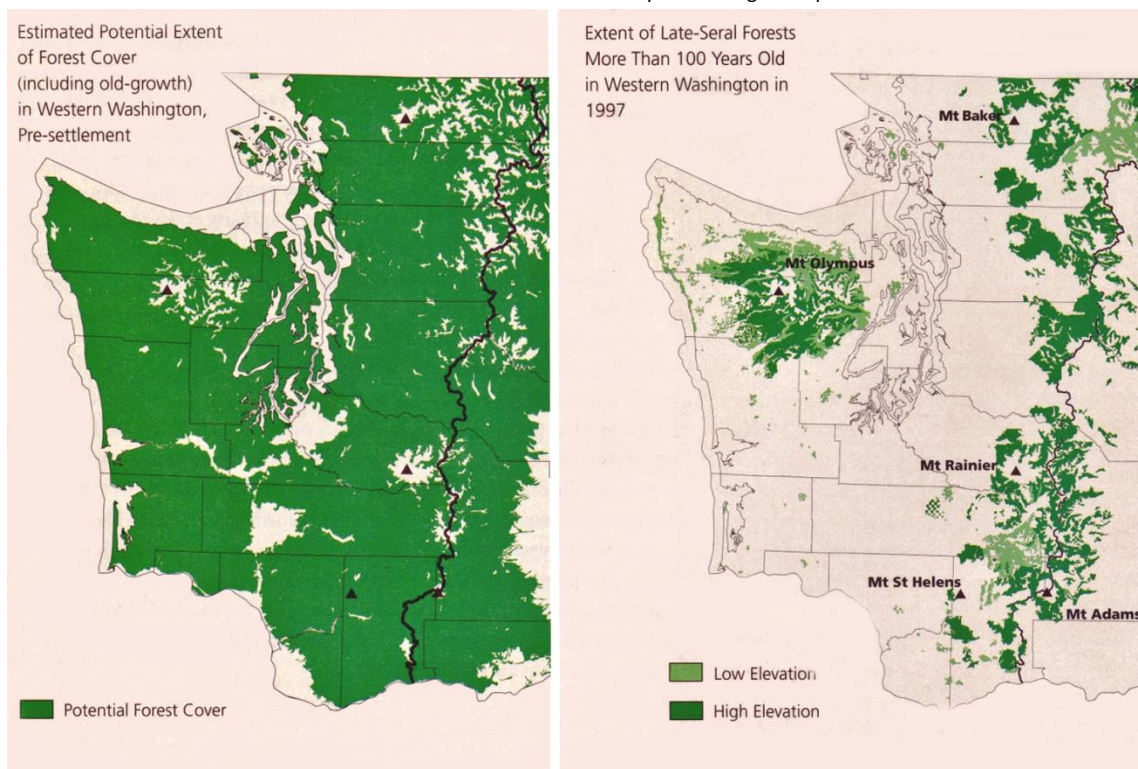
Although water quality is not a direct responsibility of WDFW, it is critical for the long-term health and survival of the state's fish and wildlife, including marine species in Puget Sound and the coastal ocean. The WDFW supports many other agencies to reduce water pollution from various sources listed above and maintain water quality standards that support healthy fish and wildlife populations. The federal Environmental Protection Agency and the Washington Departments of Ecology, Health, and Natural Resources all have important responsibilities for water quality, as does the Puget Sound Partnership.

2.3.5 Forest conservation and management practices

Over half the land area of Washington is covered in forests, ranging from the temperate rain forest of the Olympic Peninsula to the Douglas-fir dominated lowland forests of the Puget Trough, and from the stunted, slow growing trees of alpine forests to the dry, ponderosa pine dominated forests of eastern Washington. The management and commercial harvest of timber on both public and private lands has been and remains an important part of Washington's history, economy and culture.

In western Washington, forests have been fragmented by urbanization, transportation corridors, and other land development. In remaining forested areas, commercial harvest and replanting has changed the natural forest structure, resulting in simplified forest habitats and a reduction in overall biological diversity. Some commercial timberlands are also being sold to non-industrial owners and in many instances, the new owners choose to convert the land to non-forest uses. The overall loss and fragmentation of forest land in western Washington has resulted in a parallel loss of fish and wildlife habitat and wildlife movement corridors as well as diminished water quality in streams and rivers (Figure 2).

Figure 2: Forest land cover in Washington



Eastern Washington forests have also been harvested for timber and timber products for many years. Although timber harvest activities have affected the long-term structure and diversity of eastern Washington forests, these forests are nearly as extensive today as they were in 1900. The pressures of urbanization and deforestation are not as great in eastern Washington as they are west of the Cascade Mountains. One of the most severe long-term problems for wildlife and habitat in eastern Washington forests is the suppression of natural fires on both public and private forestland. Frequent, low intensity ground fires were historically part of the forest ecosystem, including forest-associated wildlife, and the recent emphasis on fire suppression has eliminated an important natural means for removing fuels and thinning stands. The lack of fires often results in denser tree cover, particularly at low elevations, and changes in both species composition and structure of natural timber stands, leading to overcrowding and increased susceptibility of these stands to damage by bark beetles and defoliating insects.

Historically, the construction of logging roads near streams or across wetlands was often destructive to fish and wildlife habitat. Although modern forest practices under state and federal rules provide much more protection for wetlands and riparian zones, there are still potential adverse impacts from

construction and operation of logging roads that do not meet modern forest practice standards. Improperly constructed or maintained logging roads may trigger or accelerate slope failure, erode stream channels, block fish migration and deposit sediment into streams and wetlands.

The WDFW is collaborating with WDNR and other agencies, organizations, and private forest landowners to promote, develop and implement forest practices that best protect the Washington's fish and wildlife resources.

2.3.6 Agriculture and livestock grazing impacts to habitat

Agriculture, like forestry, is an important part of Washington's landscape and economy. About one-third of the state's land area (15 million acres) is in agricultural production, including cropland, pastures and orchards. This current condition is a result of conversion of native grassland, shrub-steppe and wetlands to agricultural purposes since the turn of the 20th century has resulted in extensive losses and fragmentation of habitat and associated wildlife.

Historic agricultural practices didn't consider impacts to wildlife habitat, and consequently were apt to have detrimental effects. Modern agricultural practices have developed an awareness for the need for and techniques to maintain and enhance habitat quality. Agricultural development has tended to be concentrated in low elevation valleys all over the state, which has significantly reduced and fragmented valley bottom grasslands, shrublands and forested riparian habitats. Agricultural operations in valley bottoms and riparian zones have also increased sediment loads of rivers and tributary streams and past practices unintentionally introduced herbicides and pesticides into aquatic ecosystems. As a result of increased environmental regulation, publicly funded incentive programs and public values, modern agriculture has adapted to reduce impacts to fish and wildlife habitat.

Livestock grazing throughout Washington over the last century has had widespread impacts on the structure and composition of native vegetation and wildlife habitat. Although properly managed grazing can be neutral or even beneficial to wildlife, improper management of grazing (overgrazing) can destroy native vegetation, change the balance of plant species, compact soil, accelerate soil erosion, and reduce the abundance and diversity of native wildlife. The severity of these impacts depends on the number and type of livestock (e.g. cattle, sheep, and horses) and their grazing pattern. Improper grazing practices also promote the spread of invasive plants and eventually reduce the productivity of native grasslands for both wildlife and livestock.

WDFW works at many different levels, including with many individual farmers and ranchers, to influence grazing and other agricultural practices to protect and enhance fish and wildlife habitat and biodiversity on private land. In 1993, the Washington State Legislature enacted House Bill 1309, which directs WDFW and WDNR to develop consistent grazing standards that preserve, protect and perpetuate fish, wildlife and habitat on state public lands.

2.3.7 Diseases and pathogens

The rapid spread of new wildlife diseases in the United States and around the world since the beginning of the 21st century has created new challenges for both wildlife managers and public health officials. The social and economic impacts of wildlife diseases can be large, not only affecting wildlife populations and habitat but also human health, agriculture and food safety, and many nature-based industries.

A number of serious diseases currently affect Washington's wildlife populations and species at risk in every region of the state. These diseases include notoedric mange, which has become a serious risk to western gray squirrel populations; West Nile virus, a mosquito-borne virus that can cause encephalitis and/or meningitis in birds, horses and humans; avian botulism, which occurs principally in waterfowl and other birds living in an aquatic environment; and hair loss syndrome, which causes hair loss, emaciation and often death in Columbian white-tailed deer. Other diseases of current concern include hoof disease in elk, pneumonia in Bighorn Sheep, avian influenza, and white nose syndrome in bats

Hoof disease was first reported in elk populations in Washington around 2008; it has spread across the southwestern part of the state, affecting the St. Helens and Willapa Hills elk herds. Bighorn Sheep face a major threat from an exotic strain of pneumonia carried by domestic sheep and goats. The disease is often fatal in wild Bighorn Sheep, and can also affect the survival rate of lambs later born to animals that survive the disease. In 2010, roughly a third of two wild Bighorn Sheep populations totaling 260 animals had to be euthanized in the Yakima River region of Washington.

Avian influenza ("bird flu") is a viral illness found in birds. Wild birds can carry a number of bird flu viruses, but most strains do not seriously affect them. In 2014 a Gyrfalcon on northwest Washington died after eating a wild duck; it was tested and found to have a highly pathogenic strain of bird flu. In addition, a Northern Pintail Duck tested positive for carrying another strain of the virus, and this year a third form was detected in a wild duck in Whatcom County. Since then, several forms of the virus have spread quickly in the Pacific Flyway and have been found in backyard poultry flocks, commercial poultry, and wild waterfowl.

White-nose Syndrome (WNS) of bats is a disease caused by a fungus. It is estimated to have killed over six million bats in the eastern United States since 2006, and can kill up to 100 percent of bats in a colony during hibernation. Of the seven bat species so far afflicted by WNS, Little Brown Bats and Big Brown Bats occur in Washington, in addition to another 11 cave or mine-roosting species that are potentially at risk in this state. Although it has not been found in Washington to date, the fungus and disease are spreading across North America towards the West and into Canada.

WDFW works closely with neighboring states and Canadian provinces, as well as federal wildlife and fisheries agencies and the veterinary medicine and academic communities, to identify and respond to outbreaks of the wildlife diseases highlighted here.

2.3.8 Inadequate data on wildlife species, populations and

Although range, distribution, life history, populations and habitat requirements of some wildlife species under the WDFW's purview are fairly well understood in terms of life history, populations and habitat requirements, the ecology of many others is poorly known. The WDFW and its conservation partners, including the Washington Natural Heritage Program, recognize the need to design and implement additional applied research and surveys for many of the identified SGCN and Ecological Systems of Concern to better craft and prioritize conservation actions. In Chapter 4, additional research needs are outlined for some of our most imperiled ecological systems, including eastern Washington wetlands and Puget Sound prairies.

Development of the SGCN list and their associated habitats will help direct and focus the efforts of the WDFW and its conservation partners to collect more and better information in the future on wildlife species, populations and habitats. SGCN Fact Sheets (Appendix A) describe specific additional research

needs and in Chapter 4 outlines additional research and data needs for some of our most imperiled ecological systems. See also Chapter 6 – Monitoring and Adaptive Management, and Chapter 7 – Implementation for more discussion on data collection and management.

2.3.9 Climate change

Impacts from a changing climate are already being observed on fish and wildlife across the region, including a northern shift in species' ranges, shifts in the timing of ecological events, and increased incidence of disease and invasive species. Among the many consequences for Washington's natural systems, several stand out as key vulnerabilities: forests, coastal systems and freshwater habitat. Forests will be impacted both directly and indirectly through synergisms between multiple disturbances, including pest and disease outbreaks and susceptibility to wildfires, the extent and severity of which are expected to increase with climate change. Many of the state's coastal wetlands, tidal flats and beaches are likely to decline in quality and extent due to an accelerating rate of sea level rise, particularly where upland migration of habitats is hindered by bluffs or anthropogenic structures such as dikes, or where natural sources of sediment are limited. And finally, climate change is already having an impact on the state's freshwater aquatic systems, including higher average water temperatures and altered hydrology. The region's salmonids stand out as especially vulnerable given that they are expected to face climate change impacts throughout their complex life cycle. The impacts of ocean acidification on marine systems also have significant implications for wildlife and is discussed above in section 2.3.4. A summary of impacts to species and habitats and an analysis of species specific sensitivities and projected exposure to climate change are presented in Chapter 5, with supporting information available in Appendix C.

2.4 Major Conservation Strategies

Many tools and strategies are available to the WDFW and its partners to address the conservation of fish and wildlife habitat and biodiversity in Washington, on both public and private lands. These range from direct conservation efforts such as law enforcement and habitat protection, to indirect but equally important programs such as environmental education, habitat assessment and research.

Many Washington residents and decision makers care deeply about their quality of life, including their fish and wildlife resources, and they have consistently been willing to pass laws and fund programs to help identify and protect important wildlife, habitat and biodiversity. It may or may not be necessary to pass new laws or create new programs, but it is important to effectively administer and enforce existing laws and to coordinate the various federal, state, tribal and private programs that are already in place—all of which require adequate funding, staffing and support from the public and decision makers at all levels.

Some of the most effective programs, strategies and tools used by the WDFW and its public and private conservation partners are briefly discussed below.

2.4.1 Species conservation strategies

The WDFW works closely with other conservation agencies and organizations to identify wildlife species in need of special conservation measures. The USFWS and National Marine Fisheries Service (NMFS) classify and protect fish and wildlife species under the federal Endangered Species Act, and WDNR uses the NatureServe methodology to rank the global and state status of plant and animal species. For the purposes of implementing the SWAP, the WDFW will focus attention on species included on the SGCN

list (Chapter 3), which includes many classified by Washington as endangered, threatened, or sensitive. It also includes a number of species that are not included in one of those classifications but which have been identified as needing additional research or funding attention. A range of conservation actions are recommended for identified SGCN, from the development of recovery plans for endangered, threatened or sensitive species to baseline population surveys for other species. Appendix A includes fact sheets describing life history, population status, distribution, threats and conservation actions recommended for all SGCN.

2.4.2 Coordinated salmon recovery

In 1999, after Pacific salmon listings were made under the Endangered Species Act, Washington developed the *Statewide Strategy to Recover Salmon: Extinction is Not an Option* to outline the vision, goals and objectives necessary to keep salmon from becoming extinct in Washington. The Strategy identified four main areas of recovery emphasis, referred to as the “four Hs”—habitat, harvest, hatcheries and hydropower—and stressed that recovery efforts need to be appropriately integrated and coordinated at the federal, state, regional and watershed levels. Since then, large-scale, coordinated salmon recovery efforts have been underway in Washington, involving many federal, state, tribal and local agencies, as well as organized conservation groups and the public. For additional information go to: http://www.rco.wa.gov/salmon_recovery/gsro.shtml.

Salmon recovery is a complex and expensive proposition in the Pacific Northwest. The WDFW and many of its conservation partners are committed to assuring that these various efforts are successful in recovering salmonid populations. Salmon recovery is being coordinated in seven regions of the state (Figure 3).

Figure 3: Salmon Recovery Regions



In 1999, the Legislature also created the Salmon Recovery Funding Board (SRFB), composed of five citizens appointed by the Governor and five state agency directors, which provides grant funds to

protect or restore salmon habitat and assist related activities. It works closely with local watershed groups known as lead entities. The SRFB has helped finance over 500 salmon recovery projects since its creation.

2.4.3 Habitat conservation on public lands and waterways

Approximately 40 percent of Washington's land base is in public ownership, and conservation of wildlife and habitat may be easier to accomplish on these public lands and waterways than on private property, depending on the legal mission of these public lands. Most of Washington's public lands and water resources are either managed under a multiple-use concept that addresses the conservation of important habitat in the context of other uses or specifically for fish and wildlife habitat. All public land and water management agencies have some responsibility for protecting fish, wildlife and habitat on their lands. The Department of Defense and Department of Energy operate or fund active fish and wildlife programs on their lands, including Joint Base Lewis-McChord, the Yakima Training Center, and the Hanford Nuclear Reservation.

The WDFW manages a statewide network of over 1,000,000 acres of land and water that provide important habitat for wildlife while offering a range of fishing, hunting and other wildlife-related recreational opportunities. Most of these lands are designated as state Wildlife Areas and are found in almost every county in Washington. Washington Department of Natural Resources (WDNR) manages almost 3 million acres of public lands and trust lands (not counting aquatic lands), which include lands managed for timber, agriculture, recreation and conservation.

Protecting wildlife habitat and biodiversity on other public lands, including state and federal lands, depends on each agency's mission, management priorities, funding, knowledge of natural resources, and their willingness to identify and conserve areas important for fish, wildlife and biodiversity. The WDFW has many cooperative conservation agreements with other agencies and provides fish and wildlife information and habitat management recommendations to other public land management agencies on request. WDFW's wildlife areas are managed to benefit biodiversity and SGCN conservation.

2.4.4 Habitat conservation on tribal lands

About 16% of the land area of Washington is within tribal reservations. Conservation of fish, wildlife and habitat within tribal reservations is the responsibility of the governing tribal councils. The WDFW, as well as other state, federal and private conservation partners, work closely with the various tribal councils to identify and conserve important fish and wildlife resources on tribal lands. The largest Indian reservations in Washington are the Yakama, Colville, and Quinault reservations.

2.4.5 Habitat conservation on private lands

Because about 60% of Washington's land base is in private ownership, the WDFW and its conservation partners have developed many different approaches or tools for identifying and protecting important wildlife species, habitats and biodiversity on private lands. Conservation tools include direct and indirect regulation, habitat acquisition and voluntary landowner incentives. All conservation tools are important, but no single approach can adequately identify, protect, restore and properly manage the state's wildlife resources and biodiversity, especially on private lands.

WDFW regularly utilizes conservation tools that include regulations for hunting and fishing seasons, our Priority Habitats and Species lists (integrated into local land-use planning), management actions for imperiled species associated with Forest Practice Rules for private forestlands, and our hydraulic permit approval that is required for any work that is conducted that uses, obstructs, diverts, or changes the natural flow or bed of state waters.

One of the most cost effective ways to ensure the protection of important wildlife and habitat on private lands is through the application of financial and non-financial landowner incentive programs. These voluntary landowner incentives include direct local property tax reductions by counties; conservation easements by agencies and land trusts; Farm Bill tools such as the Conservation Reserve Program (CRP) and State Acres for Wildlife (SAFE) and programs such as WDFW's voluntary Upland Wildlife Restoration program, which provide direct incentives to willing agricultural landowners to protect and restore wetlands and other important habitat on their land. WDFW will continue to work with landowners, private conservation organizations, county extension agents, and conservation districts to provide technical assistance and encouragement to landowners to implement land and water management practices, including grazing practices that benefit fish and wildlife on private land.

2.4.6 Habitat acquisition

For the WDFW and conservation partners like WDNR, USFWS, Rocky Mountain Elk Foundation, The Nature Conservancy, the Trust for Public Land, and local land trusts, acquisition of land from willing landowners is an important non-regulatory tool for protecting areas with high habitat or biodiversity values. Although the cost of acquiring land can be significant compared to other alternatives, in some cases it is the best or only alternative for long-term protection and stewardship of critical habitats. The term "acquisition" is usually associated with the outright purchase of land, but may also include conservation easements, land donations, or land trades.

The WDFW has a long and successful history of identifying important habitat areas and protecting them through acquisition. The State's habitat acquisition program began in 1939, shortly after the Department of Game was established by the legislature. It tapered off in the 1970s after about 340,000 acres of habitat had been purchased, but continues today in a targeted and collaborative fashion. Currently, WDFW owns or manages over one million acres of land, all of which are open to public use 365 days a year.

In 2005, the WDFW completed a policy plan to guide its future acquisition and management of habitat and wildlife recreation lands. This plan, entitled *Lands 20/20: A Clear Vision for the Future* is available at <http://wdfw.wa.gov/publications/00726/>. WDFW assesses species and landscape conservation needs using species recovery and management plans, habitat conservation plans, biodiversity conservation frameworks, habitat connectivity analyses, and other data. The Lands 20/20 process includes robust vetting and public outreach before a project is approved to pursue funding. The following principles are employed in this process:

- Optimize, pursue, and use partnerships
- Evaluate whether acquisition is the best conservation alternative
- Pursue lands that provide long-term opportunities
- Pursue lands that will provide long-term ecological value
- Place a higher value on acquisitions that create blocks of ownership
- Pursue easements or other non-fee title options on smaller tracts
- Prioritize lands that are ecologically or socially important

A number of state and federal funding programs have been established over the last twenty years to address habitat acquisition, and these programs are administered in Washington by a mix of federal, state and local agencies, partnerships and conservation organizations including the Pacific Coast and Intermountain West joint ventures and an expanding system of regional and local land trusts. These programs include:

- Washington Wildlife and Recreation Program (state)
- Salmon Recovery Funding Board (state)
- Trust Land Transfer Program (state)
- Aquatic Lands Enhancement Account (state)
- Land and Water Conservation Fund (federal)
- Cooperative Endangered Species Conservation Fund (federal)
- North American Wetlands Conservation Act (federal)
- National Fish and Wildlife Foundation (federal-private partnership)
- National Coastal Wetland Conservation Grant Program (federal)
- Regional Conservation Partners Program (federal)

2.4.7 Research, monitoring and surveys of fish, wildlife and habitat

Scientific research has long provided the foundation for fish and wildlife management in Washington. WDFW and its conservation partners conduct ongoing research and field investigations into the ecological requirements, population status, migrations, distributions, and habitat relationships of many fish and wildlife species. The WDFW also conducts genetic research on terrestrial wildlife and fishes, performs DNA forensic analysis to support WDFW enforcement investigations, and provides technical support and expertise in wildlife veterinary medicine, including training on humane and safe handling and immobilization of wildlife species. The WDFW develops, analyzes and maintains wildlife and fish survey databases. To ensure that conservation priorities always reflect the current conservation needs of wildlife species and habitats, research and surveys will continue to be a high priority for the WDFW. Species, habitats and biodiversity survey and monitoring are addressed in Chapter 6, Monitoring and Adaptive Management.

2.5.8 Direct enforcement of state laws to protect fish, wildlife and habitat

The WDFW's direct authority for the protection of wildlife habitat is limited, although the agency does enforce state laws to protect fish habitat (Hydraulic Project Approval), and fish passage and diversion standards. Through the Washington Fish and Wildlife Commission, the WDFW establishes regulations for the legal harvest of game species and commercially harvested fish and wildlife, and WDFW officers enforce those harvest regulations statewide in cooperation with other state, federal and tribal enforcement personnel. Harvest regulations are generally conservative and designed to allow sustainable harvest that has no adverse impact on fish and wildlife populations. However, the illegal overharvest of fish and wildlife or the destruction of critical protected habitats can have a profound impact on populations that are rare, depressed or threatened with extinction. WDFW's Enforcement Program is primarily responsible for enforcing [Title 77](#), the Fish and Wildlife Code. WDFW Enforcement Officers are fully commissioned, meaning they have authority to enforce all criminal laws and have jurisdiction over federal fish and wildlife violations. They ensure compliance with licensing and habitat requirements and enforce prohibitions against the illegal taking or poaching of fish and wildlife.

2.4.9 Indirect enforcement of local, state and federal laws to protect fish, wildlife and habitat

The WDFW works closely with other agencies including local and tribal police agencies, WDNR, USFWS, and NMFS to enforce laws and regulations that are both within and outside the WDFW's jurisdiction. For example, migratory birds and marine mammals are protected and regulated under both state and federal law and jointly enforced by the WDFW, USFWS and NMFS. The WDFW also works closely with other agencies in publicizing, implementing and sometimes enforcing laws, regulations and permit conditions that prevent the destruction or degradation of important habitat, including the federal Endangered Species Act, Northwest Power Planning Act, Clean Water Act, the Washington Forest Practices Act, Shoreline Management Act and the locally administered Washington Growth Management Act. WDFW also works with the Washington Departments of Transportation and Ecology in developing and implementing mitigation measures for projects with potential adverse impacts on fish and wildlife.

Because much of Washington's authority to protect fish and wildlife habitat is shared with cities and counties, the WDFW puts a high priority on providing comprehensive biological information to local planners and decision makers to improve their ability to administer the Growth Management Act and other locally administered land use laws. The PHS program has provided site-based information to local governments since 1989.

2.4.10 Wildlife information and conservation education

Effective conservation of habitat and biodiversity is best accomplished if the public and policymakers understand fish and wildlife needs, the importance of biodiversity to our overall quality of life, and how citizens can be involved and contribute to conservation efforts. To support this understanding, it is critical that the public have opportunities to observe and enjoy fish and wildlife in their natural surroundings. As Washington's population grows, so does public demand for wildlife information and wildlife-related recreation opportunities on both public and private lands, including hunting, sportfishing, wildlife viewing and naturalists' pursuits.

The WDFW's Public Affairs Office and various teams in the Fish and Wildlife Programs communicate with the news media, the public and various government agencies and conservation groups about wildlife conservation and recreation. Interpreted wildlife viewing opportunities are offered online through the WildWatch cameras and seasonally at WDFW wildlife areas (e.g. Oak Creek elk viewing). WDFW access sites and wildlife areas provide resources online and on site to promote outdoor experiences afield by promoting access and site-specific information about wildlife viewing on our kiosks and online (http://wdfw.wa.gov/lands/wildlife_areas/). WDFW offers some watchable wildlife resources in print, but a great deal of information is provided online (<http://wdfw.wa.gov/viewing/> and <http://wdfw.wa.gov/living/>) including the *Living With Wildlife* series; marine wildlife, marine sanctuary, and SCUBA viewing guides; road trip and roadside viewing access areas' directions and interpretive materials; and information about the Great Washington State Birding Trail (developed collaboratively with our Audubon Society partners, <http://wa.audubon.org/great-washington-state-birding-trail>), among many other guides and resources.

For a more field-directed and interpreted experience, WDFW provides opportunities for volunteers to engage directly in survey, monitoring, management and conservation activities through our citizen science efforts, stewardship projects on wildlife Areas and Access Sites, and other coordinated special events. Importantly, many of these activities can be tailored and promoted to address information gaps in SGCN range, distribution and ecology. Participants volunteer with purpose, contributing directly to

the work WDFW does in exchange for training, friendship-building, and an opportunity to view and understand wildlife in their native habitats.

2.4.11 Wildlife recreation programs

The demand for traditional hunting and fishing activities remains steady in Washington. The 2011 National Survey of Fishing, Hunting and Wildlife-Associated Recreation indicated that the state of Washington is eighth in the nation in spending by recreational fishers and hunters, generating an estimated \$1.6 billion in annual revenues to the state. The fastest growing sector of wildlife recreation demand, however, is watching wildlife: an estimated 47 percent of Washington's residents participated in some form of wildlife watching in 2001. The WDFW has embraced the national Watchable Wildlife concepts and is working with the Washington Division of Tourism, Department of Transportation, Washington State Parks and Recreation Commission, Audubon Washington, and other partners to promote programs that connect with and serve traditional (hunting, fishing, resource collection) and non-traditional constituencies [e.g., birding, botanizing, butterfly and dragonfly watching, "herping" (reptile and amphibian enthusiasts)]. Wildlife viewing opportunities (passive, passive interpreted, or actively interpreted) have long been a part of WDFW's values and recreation delivery on our lands and some of our access easement programs.

More recently, WDFW and conservation partners have been growing citizen science opportunities which also provide a recreational aspect. Out in the field, projects and tools which are part of the WDFW Wildlife Areas Ecological Integrity Monitoring, eBird Northwest, and Incidental Wildlife Observation reporting (<http://wdfw.wa.gov/viewing/observations/>), tap into the enthusiasm and expertise of naturalists, avid learners, and other interested people to participate directly in the Department's survey, monitoring, and stewardship response data needs. A springtime walk through the shrub-steppe can provide opportunities to enjoy the day, connect with a wildlands experience, and provide information that can help WDFW manage our lands in an informed way. These recreational opportunities engage the public in a way to better understand fish and wildlife needs while recreating outside.

As the state's population grows, so does the demand for wildlife-related recreation opportunities and public access to wildlife on both public and private lands. The WDFW will continue to work with public and private conservation organizations and landowners to try to meet this growing public demand for wildlife recreation.

2.4.12 Forest practices management

Over half the land area of Washington is forested, and most of the state's forested landscapes continue to be managed for timber and timber products. Because of the influence of commercial forestry on the state's forest lands and wildlife habitat, it is imperative that the WDFW and its conservation partners continue to put an emphasis on influencing forest practices on these public and private timberlands. In the last 30 years, Washington's forest practices regulations have been dramatically improved and are now considered by some to be the best in the nation. It is critical that WDFW work as partners with forest landowners and other stakeholders to optimize conservation of fish and wildlife, as well as to assure that healthy forest lands remain on the landscape.

Federal forest lands within the range of the northern spotted owl are regulated by the Northwest Forest Plan (NWFP), adopted by the federal government in 1994 to provide for maintenance and restoration of functional, healthy and interconnected late-successional forest ecosystems, alongside sustainable and predictable supplies of timber and other forest products. State and private forest lands in Washington

are regulated by the state Forest Practices Act. Since the federal listing of the northern spotted owl as a Threatened species in 1990 and the passage of the Northwest Forest Plan in 1994, there have been a number of proactive efforts and agreements among public agencies, Indian tribes, conservation groups and forest landowners. These agreements work to protect listed species and their habitat, and to avoid further listings of forest species under the Endangered Species Act, while protecting the economic viability of the timber industry in Washington.

One of the most recent and successful of these public-private efforts is the Washington Forests and Fish Agreement initiated in 1997 by state and federal agencies, local governments, Indian tribes, conservation groups and private forest landowners. The primary goals of this agreement were to: provide compliance with the Endangered Species Act for aquatic and riparian-dependent species; restore and maintain riparian habitat to support a harvestable supply of fish; meet the requirements of the Clean Water Act for water quality; and keep the timber industry economically viable in the State of Washington. In 2006, Washington State completed the Forest Practices HCP, based on this Forest and Fish agreement. This HCP is the largest programmatic HCP in the nation, and the associated forest practices rules and adaptive management program are believed to be some of the most progressive in the nation. The forest practices rules apply to over 9 million acres of state and private forest lands and protect habitat on over 60,000 miles of streams. The HCP and associated rules that resulted from this agreement were developed in concert by all parties and are a good example of how a high degree of habitat protection can be achieved through collaboration.

In addition to the Forests and Fish Agreement, the WDFW and many of its conservation partners are heavily involved in other efforts to promote conservation of forest ecosystems and fish and wildlife. State forest practices rules include protections for specific state and federally listed wildlife species and their habitats, and voluntary protection strategies are developed for other listed species. WDFW screens forest practices applications for potential conflicts with wildlife species of concern; and when potential conflicts are identified, WDFW works with landowners to develop management plans which will both protect the species and their habitats, while also meeting the goals of the landowners. Other landscape management plans have and are being developed to address wildlife species of concern. WDFW is also engaged with the NWFP planning and revision processes on the various national forests to ensure that forest health, and wildlife and aquatic resource objectives are met.

The development of HCPs with private forest landowners, and most recently, public land management agencies, is a good alternative to additional federal regulation to protect ESA-listed wildlife species and habitats. In 1997, WDNR and federal fish and wildlife agencies signed a multi-species Habitat Conservation Plan that covers 1.6 million acres of state-owned trust forestlands. The WDFW is also currently at work on a similar federally-funded HCP that would apply to the management of lands owned and managed by the WDFW.

2.4.13 Landscape Conservation Efforts

Ultimately, conservation of Washington's biodiversity relies on collaboration across ownership boundaries. Federal, state, and local land-use planning needs to be coordinated and mutually supportive to meet not only the ecological goals, but other social, cultural and economic goals associated with natural resource use. Much conservation success in Washington also relies on management practices on private lands. WDFW and our partners are working to create and deliver incentives to support the ability of private landowners to uphold fish and wildlife values through their land management. Current conservation efforts require landscape-level efforts and collaboration across

broad groups. WDFW and our partners have been engaged in a multitude of such efforts, several of which are highlighted in this section. The tenets of multiple societal values, defining shared goals, and working together to preserve the future of our cherished Washington natural heritage will continue to be essential as we move forward in our efforts to conserve our state's fish and wildlife.

1. Douglas County State Acres for Wildlife Enhancement (SAFE) Program

The Douglas County's Sage and Sharp-tailed Grouse SAFE program has benefitted declining species by putting tens of thousands of acres of less productive farm lands back into shrub-steppe habitat. The Washington Department of Fish and Wildlife along with its partners have been very successful at encouraging farmers and ranchers in Douglas County to enroll in this voluntary incentive program, where Landowners enter into a 10 to 15 year agreement to plant eligible lands with native flora. The mix of seed enrollees are required to plant provides both food and cover to shrub-steppe wildlife once plants have established. Douglas County is of particular significance to shrub-steppe wildlife given it holds the last remaining population of Pygmy Rabbits in Washington. The county also is habitat to the largest populations of Greater Sage and Columbian Sharp-tailed Grouse in the state.

Since the inception of the Douglas County SAFE program, its success has surpassed expectations both in the numbers of landowners interested in enrolling, as well as the amount of land that now successfully supports a suite of shrub-steppe species. Strong enrollment was also attributed to the solid relationships and trust that our biologists have formed with Douglas County property owners. Strong teamwork with other stakeholders, including the Foster Creek Conservation District and Natural Resources Conservation Service, was also vital to how much the program has achieved so far.

2. The South Puget Sound Prairie Partnership

The South Puget Sound Prairie Partnership is an effort by federal, state, local jurisdictions, land trusts and other NGO's to either provide private landowner incentives or acquire lands to restore, and conserve grassland and adjacent oak woodland in primarily Pierce and Thurston counties, Washington. The partners use funds from a variety of sources to achieve conservation efforts. These include the Army Compatible Use Buffer Program, the Sentinel Landscape Program, funds from Washington Recreation and Conservation Office projects, Fish and Wildlife Service Recovery funds, and NRCS easement funds. The DOD programs (Army Compatible Use Buffer Program and Sentinel Landscape Program) have provided over 16 million dollars since 2006 for acquisition and enhancement of grasslands outside of DOD lands. Partners have contributed at least 7 million in funds during this period for acquisition, restoration, and easements. Joint Base Lewis McChord has provided significant funds (in the millions) during this timeframe for active management of prairies on DOD lands.

Partnership for South Puget Sound Prairies began in the 1990's with The Nature Conservancy, WDFW, WDNR, and U.S. Fish and Wildlife Service initiating planning and conservation efforts at several publicly-owned grasslands. The partnership grew during the 2000's with the addition of Joint Base Lewis-McChord (then Fort Lewis), land trusts, and expanded work by the NRCS. One of the significant achievements has been the development of genetically appropriate native seed resources for habitat restoration and species translocation and reintroduction projects for two federally listed endangered species, the Mazama Pocket Gopher and Taylor's checkerspot. Research has been conducted on habitat needs of Washington's SGCN, as well as the federally listed pocket gophers, Taylor's checkerspot, and streaked horned lark.

Major challenges for the program have been battling invasive species like Scot's broom and invasive grasses, developing and implementing a prescribed fire program, and nursery development. The Center for Natural Land Management recently took over projects formerly implemented by The Nature Conservancy, and is the primary contractor for the DOD ACUB program. They have played a leadership role in many efforts, including prescribed fire and the development of plant resources for restoration.

3. Skagit Watershed Council

The WDFW, Skagit Watershed Council, non-governmental conservation organizations, as well as other partners have been active in protecting and restoring key segments of this important watershed. The Skagit Watershed Council's strategic approach is committed to restoring and protecting landscape processes to produce long-term, sustainable recovery of habitat conditions to benefit multiple species. Their landscape scale approach is demonstrated in an analysis they carried out for a 43 river mile reach of the Skagit River. The purpose was to take a landscape scale approach to targeting priority areas so they could focus their activities to restore and protect key segments of the watershed. They also target much of their work to the delta and floodplain habitat in the lower Skagit River, given its significance for Chinook Salmon as well as a multitude of other species like shorebirds.

Non-profits such as Skagit Land Trust and TNC have also formed strong ties with the community. The Nature Conservancy in particular has taken a role in finding ways to keep working lands working, while balancing the needs of fish and wildlife. One way they have done this is by building relationships with the farmers that manage much of the land along the Skagit River. For instance, TNC has partnered with agricultural producers in their Farming for Wildlife program. This program aims to replace lost freshwater wetlands in the Skagit Delta by paying farmers to incorporate wetland habitat into their crop-rotations. A strong partnership between WDFW, TNC and others in the community has also led protection of thousands of acres in the Skagit Watershed. The Skagit Land Trust has built a broad list of partners that have helped them secure the conservation and protection of nearly 7,000 acres in the watershed. Some of the Trust's greatest successes have come in the form of projects where they have protected habitat areas across private ownership boundaries.

4. Blue Mountain Elk Initiative

The Blue Mountain Elk Initiative (BMEI) is the cooperative effort of many dedicated partners to improve habitat for elk and other wildlife across the Blue Mountains of Oregon and Washington. The BMEI partners, which include WDFW staff engagement, are consistently leveraging funds to improve wildlife habitat across the 30,000 square miles that make up the Blue Mountains Ecoregion. With this money they have funded numerous projects to improve elk habitat.

This year marks the initiative's 25th anniversary, during which BMEI partners can boast that they have leveraged nearly \$10 million. BMEI has directed much of this money to projects that have resulted in over 300,000 acres of habitat enhancements spanning political and ownership boundaries. Such work has ranged from removing weeds in mid- to higher elevation grasslands to benefit all native species to prescribed fire for restoring forest health. In recent years, BMEI has supported weed control on thousands of acres of WDFW lands. The initiative has also funded important research to guide elk habitat management.

One of the biggest challenges for the BMEI has been finding consistent sources of funds to keep up the group's momentum for funding elk conservation projects, as well as reaching out to new partners to work with. Another challenge is locating money to conduct post project monitoring for each and every

BMEI funded project. To increase the chances that BMEI funded projects will be successful, their strategy is to fund projects that not only benefit elk, but that also address other needs of land managers implementing these important projects. This strategy has increased the odds that managers overseeing BMEI funded projects achieve a successful outcome.

5. Restoring Fish Passage

Fish passage has been a priority for WDFW for decades. Since 1991, WDFW's fish passage unit has been dedicated to finding and removing fish barriers in streams and rivers across Washington. The unit's biologists, engineers, and field technicians provide all the services needed for passage restoration projects. WDFW staff is on the ground walking streams to assess potential barriers and upstream habitat gain. Over 14,000 barriers have been identified and included in WDFW's statewide database. Our biologists prioritize barriers for removal and collaborate with environmental engineers to design fish passage solutions.

WDFW also works with outside organizations, such as the Washington State Department of Transportation, to find and remove barriers on their lands. WDFW identifies and prioritizes WSDOT-owned barrier culverts and collaborates on design and construction of barrier removal projects. WDFW also evaluates and monitors the post construction effectiveness of all WSDOT fish passage projects. As a leader in fish passage, WDFW developed the Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual to teach other restoration groups on proper procedures for collecting and managing barrier information. These science-based protocols are nationally recognized and the standard for collecting data on a fish barrier.

In 2014, the Washington State Legislature created the Fish Passage Barrier Removal Board to identify and expedite and a coordinated statewide approach to fish barriers removal. Chaired by WDFW, the board is represented by other state agencies, tribes, city and county governments, as well as the Governor's Salmon Recovery Office. The goal of this board is to coordinate the removal of barriers within a watershed to help ensure fish passage throughout the entire stream. WDFW is developing a grant program to fund projects that remove several barriers along a stream and projects that open more habitat upstream of recent barrier removal sites. This statewide initiative builds on the momentum of existing restoration programs and partnerships, but funding is needed to implement coordinated work that maximizes investments.

6. Yakima Basin Integrated Plan

For decades stakeholders have disputed over control of the Yakima Basin's over-allocated water supply. These disputes involved irrigators; federal, state, local, and tribal governments; as well as conservationists and community leaders. After five drought years in a 15 year period the problem only became worse. So after decades of inaction, water users throughout the region put aside their differences to craft a consensus-based plan for meeting everyone's needs. Spearheaded by the U.S. Bureau of Reclamation and the Washington Department of Ecology, this effort became the Yakima Basin Integrated Plan (YBIP), whose goal it is to restore the ecological integrity of the Basin while shoring up existing agricultural water rights.

To restore ecological integrity, YBIP partners have set out to acquire nearly 100,000 acres of forest and shrub-steppe, protect 200 miles of river, and increased fish passage on six existing dams. Since the plans inception in 2009, partners have quickly come a long way to meeting these objectives. The most

notable accomplishment is the 50,000 acre Teanaway Community Forest acquisition in 2013, the single largest land transaction in Washington in 45 years. This transaction was made possible because this diverse set of stakeholders worked together for a common set of goals. Washington Department of Fish and Wildlife and DNR jointly manage this property as a working, recreational forest managed as a healthy watershed with input from the local community. Another success was the completion of the Manastash Creek Project in 2014. Water conserved from removing a diversion in Manastash Creek has increased instream flow and opened up 25 miles of habitat for steelhead, coho, bull trout, and spring Chinook.

Key to these extraordinary achievements is the strong relationships that have been built amongst the diverse range of private, local, state, and federal entities. This includes the mutual trust that has been built with the Yakama Nation, irrigators, local governments, and conservation organization through years of working together. This relationship along with others helped WDFW and our partners work out an agreement that ultimately became the YBIP. Upon its completion, the YBIP is estimated to cost nearly \$3.8 billion. Many consider the YBIP a model because for every dollar spent, nearly double the investment will be gained from tangible benefits to stakeholders, including increased water for farming and more productive fisheries.

7. Mountain to Sound Greenway

A coalition of diverse stakeholders makes up the Mountain to Sound Greenway partnership, including environmentalists and timber companies; developers and farmers; federal and state agencies; cities and counties; nonprofits and businesses. This partnership focuses on the conservation, restoration, and protection of lands that make up this greenway that parallels Interstate-90 from the shores of Puget Sound, over the Cascades, to the arid landscapes of Central Washington. The Greenway was first envisioned in 1990 by a group of citizens when the region experiencing a significant economic and development boom. They saw that unchecked urban sprawl had the potential to fragment much of this corridor and they wanted to keep this landscape intact and connected.

WDFW supports the shared vision of the partnership in a many ways. This includes WDFW's purchase of thousands of acres of lands to form contiguous blocks of public lands where otherwise there lands would be in a checker board of public-private ownership. The Trust also had a role in acquiring the 50,000 acre Teanaway Community Forest, which lies at the eastern flank of the greenway. They also have brought on board many supporters in Washington D.C. to push for a proposal to designate the greenway as a National Heritage Area. Overall, the trust has been involved in purchases or exchanges of 170,000 acres of new public lands.

8. Merrill Lake Conservation

WDFW and the Rocky Mountain Elk Foundation are pursuing almost 1,500 forested acres adjacent to Merrill Lake. For a number of reasons WDFW considers this site, which lies just southwest of Mount Saint Helens, a priority for protection. Merrill Lake is an ecologically unique and diverse place that is home to old-growth forest, miles of riparian corridor, seeps and springs, wetlands, and lava tubes. As for fish and wildlife, biologists have documented high numbers of SGCN, primarily amphibians. Western Toad, Larch Mountain Salamander, Van Dyke's Salamander, and Cascade Torrent Salamander occur on site. Other SGCN include Steelhead, Northern Spotted Owl, and Bald Eagle. As for Merrill Lake's place in the big picture, it lies at a strategic landscape position and would provide important connectivity. Just north and east is Mount Saint Helens National Monument, while Washington Department of Natural Resource holds large land blocks just south of Merrill Lake. Although these blocks are separated by a

small area of private lands, a Merrill Lake acquisition would nearly link the two large blocks of public land together.

From almost the start, the Merrill Lake project has garnered support from everyone involved, including partnering conservation organizations in the region. Strong support has also come from the community, including the Cowlitz County Commission and local sportsman groups. The latter have a personal connection to this land because for years the landowner has opened it to recreation. This project success has a lot to do with these relationships and with the trust we have built with the landowner and with this community. The Merrill Lake project has seen challenges in acquiring the needed funds to purchase the property, though all are confident that it will happen thanks to everyone patiently staying engaged. This is testament to the fact that all involved have felt they have something to gain by protecting Merrill Lake.

9. Washington Wildlife Habitat Connectivity Working Group

The Washington Wildlife Habitat Connectivity Working Group is a science-based partnership that is composed of participants representing land and natural resource management agencies, organizations, tribes, and universities. The working group is co-led by Washington Department of Fish and Wildlife and the Washington Department of Transportation. Organizations and/or individuals engage in the development of analyses within the Washington Connected Landscapes Project.

The Full Working Group encompasses all participants and includes talents in science, communications, and implementation. This group has produced several research papers regarding habitat connectivity needs and modeling results statewide as well as in the Columbia Plateau and Transboundary regions of Washington. Current efforts include looking at connectivity needs in the Southwest coastal region. The work of the WWHCWG has been utilized in several landscape conservation efforts. The vision for the Working Group is for connectivity to be consistently included in decisions and conservation actions related to: land use, restoration, private landowner incentive programs, species recovery, and wildlife area plans. WDFW is working to integrate the results into multiple on-going implementation efforts and to integrate more on-the-ground land managers into the development of future products.

10. Northcentral Washington Prescribed Fire Council

Established in 2005 by WDFW fire experts and partners, the Northcentral Washington Prescribed Fire Council's (NCWPFC) mission is to protect, conserve, and expand the safe use of prescribed fire. More specifically, the group works to promote an understanding of benefits of fire, distribute guidance for prescribed fire safety, endorse fire management and safety policies, and provide a platform for communication. Support for the council has come from state, federal, and county government; conservation districts; industry trade organizations and professional societies; landowner groups; university extension; as well as conservation organizations.

Overcoming the public's negative perception of fire has been a significant challenge for the NCWPFC. Prescribed fire is still not a widely accepted tool, although council members say the health of many ecosystems in Washington depend on its widespread use. The Council is actively working to dispel negative attitudes and teach about the ecosystem health benefits of fire. They have done this by holding media events and by producing and distributing flyers and fact sheets on various topics concerning fire management. The NCWPFC also has periodically pushed for legislation. One such effort was their push for a law to indemnify fire managers, on condition they adhered to strict safety protocol

prior to an accident. The ultimate vision of many Council members is to see the day when fire becomes a go-to tool to manage for healthy fire-dependent ecosystems in Washington.

11. Arid Lands Initiative

Formed in 2009, Washington's Arid Lands Initiative (ALI) is a collaboration of public, private, and tribal interests working to conserve and restore viable and connected terrestrial and freshwater systems in Washington's shrub-steppe and Palouse prairie landscapes that support plants, fish, wildlife, and the communities who depend on these resources. WDFW has been a core partner of the ALI since its inception.

Experts and stakeholders working through ALI have developed guidance to assess ecosystem health and the species that characterize eastern Washington's arid lands. This included identifying focal systems and species requiring management to achieve successful conservation. The species and systems ALI identified include many that WDFW classify as Ecological Systems of Concern and Species of Greatest Conservation Need. They also identified key locations across the arid landscape requiring immediate actions, and are currently working to map the necessary actions to specific places across the landscape. In this way, the ALI partners have laid out a road map for investing resources and for engaging partners to help efficiently manage and conserve key locations.

Partners are putting the ALI's shared priorities into practice by using Initiative tools to guide their own conservation work. Federal and state partners in particular have begun using these products in a range of ways. The USFWS and WDFW are using priority area maps developed by ALI to identify where to invest Candidate Conservation Agreement with Assurances resources to safeguard sage grouse. WDFW is using these same tools to guide many of their eastern Washington private landowner conservation efforts and land acquisitions. Products developed by ALI are also guiding decisions to mitigate the impacts that the Vantage to Pomona transmission line will have on valuable shrub-steppe and sage grouse habitat.

ALI is gradually identifying more projects to move from planning to implementation. In light of a changing climate, habitat fragmentation, and the complex ownership patterns that currently characterize these arid landscapes, a forum for partners to coordinate conservation action continues to be essential for the long-term preservation of fish and wildlife across the Columbia Plateau.

12. Simcoe Mountains Acquisition

WDFW is partnering with the Eastern and Central Klickitat Conservation Districts to conserve fish and wildlife habitat, as well as promote non-motorized recreation and working lands on a large tract of privately owned timber lands in Klickitat County. The Simcoe site sits in the Simcoe Mountains of central Klickitat County, just south of the Yakama Reservation. WDFW recognizes the value that the Simcoe's hold for their high ecological integrity. Of particular interest for fish and wildlife conservation are two relatively large blocks of land that feature intact Oregon white oak woodlands, riparian corridors, and shrub-steppe. The combined land area of the two tracts is nearly 20,000 acres, much of which is important habitat for many SGCN, including Steelhead, the State Threatened Western Gray Squirrel, as well as Western Toad, Golden Eagle, Black-tailed Jackrabbit, and White-headed Woodpecker. These lands would constitute a near contiguous corridor of protected lands running the length of the east slope Cascades from the boarder with British Columbia to the Columbia River.

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